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REMARKS

As of this Response to the Office Action dated July 11, 2003, claims 1-6, 13 and 15-18 are pending, with claims 1-6 and 13 having been rejected in the outstanding Office action, previously withdrawn claims 7-12 and 14 having been canceled in the present amendment, and new claims 15-18 having been added in the present amendment. The rejection of claims 1-6 and 13 is traversed for the reasons explained below, and claims 1, 3 and 5 have been amended for the reasons explained below.

Status of the Formal Drawings

The examiner's acceptance of applicants' drawings is noted with appreciation.

Status of the Priority Claim

The examiner has acknowledged applicant's priority claim. However, the examiner's acknowledgement is of a claim for domestic priority under 35 USC §§ 120 and/or 121 (item 15 of the Office Action Summary), whereas applicant's claim for domestic priority is to a provisional application under 35 USC §§ 119(e) (item 14 of the Office Action Summary). The examiner is requested to correct the acknowledgement for domestic priority.

Status of Examiner's Consideration of Applicants' Information Disclosure Statements

The examiner's acknowledgement of applicants' Information Disclosure Statements filed November 8, 2001 and March 25, 2003 is noted with appreciation.

Explanation of the Amendment of the Title and Summary

Applicants have amended the Title of the Invention section of the present application to conform the Title with cancellation of claims relating to reading, in response to the examiner's restriction requirement.

Applicants have amended the Brief Summary of the Invention section of the present application by deletion of material to conform with cancellation of claims relating to reading, in response to the examiner's restriction requirement.

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Applicants have further amended the Brief Summary of the Invention section of the present application by adding material in new paragraphs [0018.1] and [0018.2] that is essentially identical with new independent claims 15 and 17 respectively.

Explanation of the Amendment of the Claims

Claim 1 has been broadened somewhat by deletion of "establishing a voltage differential" to leave the broader step of simply generating channel-initiated secondary hot electrons, without reference to the voltages for doing so.

Claims 3 and 5 have been amended to be consistent with the changes to claim 1. They have not been narrowed.

Claims 1, 3, 5 and 13 are not Unpatentable Under 35 U.S.C. § 102(b)

Claims 1, 3, 5 and 13 were rejected under 35 U.S.C. § 102(b) as being anticipated by US Patent No. 5,457,652, issued to Brahmbhatt. The rejection is traversed.

Brahmbhatt achieves programming by the use of direct hot electron injection from the channel, not channel-initiated secondary electron injection as recited in the rejected claims and described in detail in the present application. Brahmbhatt teaches conventional hot electron injection, as is apparent from the programming mechanism disclosed at column 4, lines 2-6, as well as from the discussion of the invention background at column 1, lines 44-48. In contrast, rejected independent claim 1 (and therefore its dependent claims 3 and 5) contains the limitation in lines 6-9 of "generating channel-initiated secondary hot electrons," and rejected independent claim 13 contains the limitation in lines 2-4 of "a memory array ... programmable using channel-initiated secondary electron injection." As will be appreciated from applicants' description in Paragraph [0039] of the present application of the properties of a memory cell suitable for programming by channel-initiated secondary hot electrons, special doping profiles such as illustratively a halo implant (page 11, lines 8-9) and certain optimizations (page 11, lines 13-16) are employed in order to operatively generate channel-initiated secondary hot electrons. As these structures are absent from the disclosure of Brahmbhatt, Brahmbhatt does not inherently disclose operatively generating channel-initiated secondary hot electrons. As Brahmbhatt neither explicitly nor inherently discloses either generating channel-initiated secondary hot electrons or a

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memory array that is programmable using channel-initiated secondary electron injection, claims 1, 3, 5 and 13 cannot be anticipated. Withdrawal of the rejection respectfully is requested.

Claims 2, 4 and 6 are not Unpatentable Under 35 U.S.C. § 103

Claims 2, 4 and 6 were rejected under 35 U.S.C. § 103 as being obvious over US Patent No. 5,457,652 issued to Brahmhatt, in view of US Patent No. 5,553,020 issued to Keeney et al. The rejection is traversed. As claims 2, 4 and 6 are dependent from claim 1, applicants will address the non-obviousness of claim 1, it being understood that dependent claims 2, 4 and 6 are considered to include the limitations of claim 1 and therefore would be patentable if claim 1 is patentable. While these dependent claims may contain additional limitations of independent patentable significance, discussion thereof would be superfluous.

The disclosure of Brahmhatt is discussed above. The disclosure of Keeney et al. is similar to Brahmhatt insofar as it also pertains to cells programmed using direct hot electron injection from the channel. It will be appreciated that Keeney et al. really is not very relevant at all, since it does not contain any disclosure as to the bias condition on the unselected word line during programming.

Rejected independent claim 1 contains the limitation in lines 6-9 of "generating channel-initiated secondary hot electrons." As will be appreciated from applicants' description in Paragraph [0039] of the present application of the properties of a memory cell suitable for programming by channel-initiated secondary hot electrons, special doping profiles such as illustratively a halo implant (page 11, lines 8-9) and certain optimizations (page 11, lines 13-16) are employed in order to operatively generate channel-initiated secondary hot electrons. Since these structures are absent, both explicitly and inherently, from the disclosures of Brahmhatt and Keeney et al., these references taken singly or together do not either teach or suggest operatively generating channel-initiated secondary hot electrons, and therefore cannot possibly teach or suggest applying voltages having a relative magnitude and polarity to repel such channel-initiated secondary hot electrons.

Applicants would like to reply with specificity to the main point raised by the examiner. The examiner observed that Brahmhatt teaches a single supply arrangement in which the

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deselected word line is at $-V_V$ potential (-3 volts to -4 volts) and the P well also is at $-V_V$ potential (-3 volts to -4 volts); see Brahmbhatt Table 1 and column 6, lines 41-43. Observing also that dependent claims 2, 4 and 6 include two -2 volt limitations and asserting that these voltages correspond to the $-V_V$ potential (-3 volts to -4 volts) on the deselected word line and the P well of Brahmbhatt, the examiner argues that one of ordinary skill in the art would have found it obvious to use either Brahmbhatt or Keeney teachings "to apply to the first to fifth voltages to the memory cells for causing hot electron injection in programming the cells, since it have been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art."

Without expressing any agreement or disagreement with the legal principle stated by the examiner, applicants reiterate that the voltage combination used in a cell programmed by hot electron injection does not necessarily carry over to a cell programmed by channel-initiated secondary hot electrons because of differences in the cell dimensions and doping profiles. In fact, just the opposite is true – one would expect the voltages *not* to carry over since one of the advantages of channel-initiated secondary hot electron cell operation is the use of different voltages, specifically lower voltages, in conjunction with a negative p-well bias that repels the secondary hot electrons toward the channel so that they can tunnel into the floating gate. See Present Application, Paragraph 14. Since neither Brahmbhatt nor Keeney et al. contain any disclosure whatsoever that would motivate one to use their voltage disclosures to program channel-initiated secondary hot electron cells, their combination also lacks the any such motivation.

While motivation can arise from a common problem, the problems addressed by Brahmbhatt and Keeney et al. are entirely different from the problem solved by the present invention. The present invention solves the problem of program disturb when programming with channel-initiated secondary hot electrons. Not only do Brahmbhatt and Keeney et al. have nothing to do with programming with channel-initiated secondary hot electrons, they are not even concerned with the problem of program disturb. Brahmbhatt is concerned with the problem of reliably reading the state of cells in low power operations, *see* column 2, lines 8-34; while Keeney et al. is concerned with precise control of the threshold voltage in a multilevel cell architecture, *see* column 3, lines 13-19. Lacking any teaching or suggestion, and lacking even any motivation,

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the combination of Brahmbhatt in view of Keeney et al. cannot possibly render the present invention obvious.

New Claims 15-18 Have Been Added

New claims 15-18 have been added pursuant to applicants' right to present the claimed subject matter in a reasonable number of claims of varying scope. Independent claims 15 and 17 contain a limitation that the memory transistors in the memory array are programmable using channel-initiated secondary hot electron injection, and claims 16 and 18 are respectively dependent therefrom. These claims are fully supported by the present application as filed and contain no new matter.

Conclusion

In view of the amendments and reasons provided above, it is believed that all pending claims are in condition for allowance. Applicants respectfully request favorable reconsideration and the timely issuance of a Notice of Allowance. If a telephone conference would be helpful in resolving any issues concerning this communication, please contact the undersigned at (952) 253-4135.

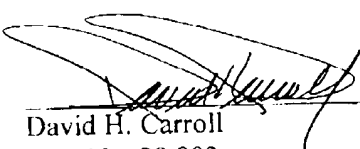
Respectfully submitted,

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Date: October 14, 2003



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